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AUTHOR Mohan, Bernard A.
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ABSTRACT

Research on themes that offer practical and theoretical bases for teaching language and content simultaneously is discussed. Three theoretical perspectives are cited that are relevant to this approach: the input hypothesis (Krashen's monitor model), the bilingual proficienty theories (Cummins' language proficiency model and the views of its critics), and language socialization theories. Research on cognition is reviewed, with emphasis on the area of knowledge structures. It is suggested that knowledge structures underlie subject-area knowledge and thinking skills and are cross-cultural, and that they also underlie expository reading and writing knowledge. It is further suggested that student awareness of knowledge structures and information patterns improves the retention of subject matter. Research on cognition is also reviewed regarding "student tasks," or those metacognitive strategies that language learners use in order to gain second language knowledge. The idea is proposed that student tasks may form the basis for teaching and learning strategies such as cooperative learning and English for specific purposes. It is suggested that knowledge structures and student tasks are complementary and that more research should explore their relationship. Contains approximately 145 references. (LB)

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LEP STUDENTS AND THE INTEGRATION OF LANGUAGE AND CONTENT: KNOWLEDGE STRUCTURES AND TASKS

Bernard A. Mohan

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INTRODUCTION

The integration of language and content (ILC) has been the subject of a number of recent books (Mohan, 1986; Early, Thew & Wakefield, 1986; Early & Hooper, in press; Cantoni-Harvey, 1987; Crandall, 1987; Benesch, 1988; Enright & McCloskey, 1988; Brinton, Snow & Wesche, 1989) and it has been discussed or reviewed in an increasing number of articles (e.g., Mohan, 1979; Shih, 1986; Crandall & Tucker, 1989; Snow, et al. 1989; Wong-Fillmore, 1986, 1989; Spanos, 1990; Christian, et al., in press). While much of this literature discusses American experience, there is a growing amount which discusses work in other countries, such as Australia (Cleland & Evans 1984), Britain (Bourne, 1989; Reid, 1989) and Canada (Ashworth, 1988).

This paper will review research relating to LEP students and the integration of language and content. Rather than being a comprehensive review, it will be a systematic review. In my opinion, the integration of language and content should relate language learning, content learning and the development of thinking, and should aim to find systematic connections among them. This review will, therefore, focus on two main themes that appear in the research literature and that offer systematic connections: knowledge structures and student tasks. Knowledge structures are patterns of organization that are important in both language and content knowledge, a familiar example being the temporal ordering of actions and events. Student tasks are the units of student work in both language classrooms and content classrooms, the clearest example being the student assignment that is evaluated or graded.

The integration of language and content can be broadly defined as mutual support and cooperation between language teachers and content teachers for the educational benefit of LEP students. Language development and content development are not regarded in isolation from each other and there is a focus on the intersection of language, content and thinking objectives.

ILC is clearly different from language teaching "in isolation," which ignores content development. ILC is also different from those forms of content-based language teaching which use content merely as a means for language development, ignoring content and thinking aims. Since we must draw to a

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large extent on the literature of language teaching, it is necessary to make a very clear distinction between ILC and a perspective which considers second language learning only. Because it sees language as the major medium of learning, ILC aims beyond second language learning to learning language for academic purposes and beyond language learning to content learning. "Language" includes not only the rules of sentence grammar but also the organization of discourse; "content" includes not only content in the sense of the message of a sentence but also content as it is seen by the content teacher, content as the organization of information within the perspective of a discipline.

Assumptions

(1) Since education systems aim to deliver education services to all students and since language is the major medium of learning, an important education aim is to support language as a medium of learning to enable students to be academically successful. This applies to native speakers of English (L1 speakers) as well as LEP students. For example, Langer and Applebee (1987) responded to NAEP results that indicated L1 student weaknesses in writing and in higher level thinking skills and studied the role of writing in thinking and learning in secondary school content classrooms. They identified a need for clear conceptualizations of the components of effective discourse in particular disciplines. Approaches designed to attain such goals have the potential to be valuable to all students, whether first or second language learners.

(2) For ESL programs in schools in the United States the main goal is to enable students to be academically successful in subject-area classrooms where English is a medium of learning. But few programs use approaches specifically designed to achieve this aim (Chamot & O'Malley 1987).

(3) ESL programs should go beyond the development of conversational skills to develop the cognitive-academic language proficiency required for academic success (Cummins, 1984; Saville-Troike, 1984). The development of sentence-level language and oral conversational skills is not sufficient. Students must be aided to develop those language competencies, including literacy competencies, which are also goals of programs for native speakers of English.

(4) LEP students' learning should build on the educational, cultural and personal experiences they bring to school. In language learning, students' previous experiences with oral and written language should be a basis for their second language development and their literacy development (Heath, 1983; Hudelson, 1986; Edelsky, 1986; Cummins & Swain, 1986; Enright & McCloskey, 1988; Moll & Diaz, 1987)

(5) Verbal language is not the only mode of language as a medium of learning. Younger learners often express themselves through multiple media, using both drawing and text (Harste, Woodward & Burke, 1984; Dyson, 1986). In the later years, graphic representations and the connections across different modes of meaning should be exploited for the benefit of LEP students rather than ignored (Early, 1989).

(6) Under favorable circumstances, it generally takes between four and seven years for LEP students to reach national norms on standardized tests in reading, social studies and science, an indication of the time taken to master a second language for schooling, but we cannot delay academic instruction until students have mastered basic L2 skills (Collier, 1987, 1989). We cannot place LEP students' academic development on hold during this period, and language programs alone cannot provide the necessary support to learners. Subject matter teachers and content classrooms must play a large and essential role. We must rely on the cooperation of content teachers from different specialisations at all grade levels.

(7) There is need for approaches to teaching LEP students which incorporate content goals and integrate language and content. In one survey of content teachers, only 12% modified their instruction for LEP students, and over 80% were unwilling to do so and believed that English language proficiency should be a prerequisite for enrollment in content area classes (Gunderson, 1985). A partial explanation may be Langer's and Applebee's (1987) finding that content teachers were reluctant to devote time to writing as a means of learning if such approaches did not promote learning of the teacher's own subject but were perceived as a means of fostering the work of the English teacher. Another partial explanation may be Penfield's (1987) finding from a survey of content teachers that the large majority of the teachers expressed a need for more training on how to teach content to LEP students but had little knowledge of how to integrate content and L2 development.

(8) The integration of language, subject area knowledge, and thinking skills requires careful systematic planning and monitoring. It should not be left to chance. It is often assumed that a content course taught to a class of second language learners is an excellent environment for second language learning. But, in a study of French immersion programs, where English speaking students were learning content through the medium of French, Swain (1988) challenged this myth and showed that "not all good content teaching is necessarily good language teaching." For example, typical teacher-dominated content classrooms merely required students to give brief oral answers to questions or to fill in blanks and provided little opportunity for the sustained student talk needed to develop complex language use. In another striking example, a history lesson was taught largely in the future tense, not the past, missing the opportunity to help students develop appropriate form-meaning

relationships in language. As Swain points out, such content teaching needs to respond to the students' needs as language learners and to incorporate the design features of good language lessons; it needs to guide students' progressive use of the full functional range of language and to support their understanding of how language form is related to meaning in subject-area material.

(9) "Tasks" and "Knowledge structures" provide two research bases for systematic planning and monitoring of ILC. As we shall see, the research on student tasks provides insights into the quantity and quality of student language use, among other things, and the research on knowledge structures provides insights into how language form is related to meaning, among other things.

Theoretical Perspectives

It is helpful to consider ILC with respect to three theoretical perspectives: Krashen's Monitor model, Cummins' Language Proficiency model, and the Language Socialization perspective.

Krashen's Monitor Model

Krashen's monitor model has a central principle: the input hypothesis. The claim is that human beings acquire language in one way only, by understanding messages or by comprehensible input (Krashen, 1985). Krashen's work has been widely discussed and has played an important role in encouraging ESL teachers to move from a grammar-based approach to a more communication-oriented approach. It has also been influential in encouraging content teachers to make efforts to be more comprehensible by adjusting their speech and by providing contextual support. Its stress on comprehension has been beneficial.

This model has been critizised for appearing to "provide all the answers" but in fact being untestable and thus doing a disservice by disguising research problems (McLaughlin, 1987). The same criticism applies to the way this model treats ILC, for the model actually has nothing to say about integration.

Krashen's model is a theory of second language acquisition, not a theory of knowledge acquisition. It speaks to the goals of the language class not to the goals of the content class. It distinguishes between language classes that provide more comprehensible input and those that provide less. As far as the model is concerned, content classes are merely possible sources of comprehensible input, hardly a perspective that is likely to appeal to the content teacher. In Krashen's model, "content" simply means "message," and "comprehensible input" is language with an understandable message or content. "Content" does not have the specific meaning that it has for a content area teacher, and

integration is a non-issue. The danger with this model is that it appears to address the issue of ILC but in fact merely disguises the problems.

Cummins' Language Proficiency Model

In Cummins' model, language proficiency, first or second, is considered to be related to two continua. Communicative tasks may be either more context-embedded or more context-reduced; and communicative tasks may be either more cognitively undemanding or more cognitively demanding. Bilingual proficiency means that the development of proficiency in one language can contribute to the development of the other; there is a common underlying proficiency. This interdependence of development is most characteristic of context-reduced, cognitively demanding language proficiency, of which literacy skills are a central case (see Cummins, et al., 1989; Cummins, 1990), although oral discourse can be context-reduced and cognitively demanding. Sociocultural factors affecting attitudes towards languages and cultures are important for explaining differences between bilingual education for majority and minority language groups.

With respect to ILC, this model has played a very important role by drawing attention to the differences between basic conversational language and academic language proficiency which takes years to acquire. It underlines the importance of recognizing and respecting the resources of both the bilingual's languages and the opportunities for positive transfer, especially in literacy. Because it considers both first and second language development, it implies that there is a need to go beyond a second language acquisition perspective and to incorporate first language development research.

Cummins' view of language proficiency, the central element of the model, has been criticized (Rivera,1984; Edelsky, 1986; Martin-Jones & Romaine, 1986). Critics have argued that tests in school do not truly measure language competence so that Cummins is really referring to test-wiseness, and that literacy skills are specific to particular cultures and communities so that the notion of a common underlying proficiency is problematic. Also problematic is the notion of context-dependence (Mohan & Helmer, 1988). The debate indicates that there is little clarity about the concept of academic language proficiency, which is a serious matter not only for ILC but for education generally. Important questions are, therefore: Can we identify academic language proficiency? Can we identify cognitive/linguistic elements which are cross cultural? Can we clarify the concepts of context and context dependence?

Language Socialization Perspective

The language socialization perspective is not a model devised by one individual but is rather a set of related ideas shared to some degree among a

diverse group of scholars without any necessary uniformity. While Krashen's and Cummins' models derive from a natural science tradition in social science, which looks for causal explanation, this perspective derives from the very different "interpretive" approach, which explores how people assign meaning to their social world (Braybrooke, 1987). Language socialization means both socialization through language and socialization to use language. For example, the child learning language is also learning about the world, learning through language. The notion of language socialization draws on sociological, anthropological and psychological approaches to the study of social and linguistic competence within a social group. If language acquisition aims at the study of linguistic competence, language socialization aims at the understanding of how persons become competent members of social groups and what role language plays in this process (see Schieffelin & Ochs, 1986a, 1986b). ILC with LEP students is a special case of language socialization since we need to study how LEP students learn language and subject matter at the same time.

We will pick out two themes from the language socialization perspective and then apply them to ILC with LEP students in the two major sections of this paper as a way of organizing two coherent strands in the research literature. The two themes are "Knowledge structures" (or text structures or genres) and "tasks" (or activities or social situations or contexts).

Both of these themes can be seen in the seminal work of the anthropologist Malinowski. With respect to knowledge structures/text structures/ genres, his study of the language of Trobriand gardening (Malinowski, 1935) examines the Trobriand classification of plants and its vocabulary using textual evidence, a theme elaborated in later anthropological work in ethnographic semantics with an expanded range of knowledge structures, in comparable work on knowledge structures in cognitive psychology (Schank & Abelson, 1977), in work on genre in systemic functional linguistics (Martin 1985), and, an obvious inheritance, in work on Language for Specific Purposes (Swales, 1985). With respect to tasks/activities/social situations/ contexts, the same work of Malinowski introduces the notions of "context of situation" and "context of culture," notions elaborated in functional systemic linguistics (Halliday, 1978; Halliday & Hasan, 1985). Similar views of discourse as structured by speaker-hearer conceptions of the social activity or social event taking place, and of the social activity as constructed by the negotiation of situated meaning, appear in the Vygotskyan school of psychology which emphasizes the role of social activities in the development of the mind, and in the work of Bruner on novice-expert learning interactions in highly framed situations (Rogoff & Wertsch, 1984; Bruner, 1983).

KNOWLEDGE STRUCTURES AND ILC

This section will discuss knowledge structures (KSs). It will begin by outlining a set of fairly abstract and general KSs and present evidence that they are cross cultural. Next we will discuss how they appear in school knowledge. Then we will consider the importance of graphic representations of KSs. This will be followed by exploring the way KSs underlie expository text, both in reading and writing. Finally we will tie the strands together through the use of graphics to aid reading and writing in the content areas.

How do learners organize school knowledge so as to understand, remember and apply new information? An explanation from cognitive psychology is that knowledge is schematized, or organized in chunks or packages, and that schemas or knowledge structures facilitate comprehension, memory and application (Abelson & Black, 1986). Abelson and Black point out that knowledge structures are not fixed and static but are flexible and dynamic.

Because the notion of schema is so general and bland, it is necessary to focus on certain classes of knowledge structure. Figure 1 outlines a set of knowledge structures discussed in Mohan (1986). There are three pairs of related structures: a description of a particular object or person often involves a classification or set of general concepts; a particular temporal sequence of states, events or actions often involves general principles (social rules or cause-effect relations) which relate one state to another; a particular choice or decision often involves general values. These knowledge structures are broad and general patterns of the organization of information, at a fairly high level of abstraction. A typical situation, activity or task includes them but is not limited to them. They are meant as heuristic guidelines for the discussion which follows.

Knowledge structures are not predetermined and inevitable patterns which are inherent in experience, nor are they final and unchallengeable orderings through which others can control the experience we have. Rather, knowledge structures are ways of organizing experience through which we, as human beings, give a coherent structure to experience. It is now widely recognized, for example, that personal narrative is not simply a reflection of the temporal flow of past events but is a way in which we ourselves create coherent meanings from our daily lives. This process of story creation is just one example of a more general process of giving shape, structure and coherence to experience through "experiential gestalts" (Lakoff & Johnson, 1980: 117). Awareness of knowledge structures can be liberating. As Lakoff & Johnson persuasively argue, awareness of the patterning of experience is helpful in realizing that the way we have been brought up to see the world is not the only way and in appreciating the different perspectives of other cultures.

Are these knowledge structures cross cultural or are they limited to a particular cultural group? This question is addressed by cognitive anthropology (Spradley, 1980; Casson, 1981; Werner & Schoepfle, 1987), particularly by ethnographic semantics, the subfield of ethnography devoted to the analysis of knowledge systems of cultural domains. In a major work of systematization of the craft of ethnography, Werner and Schoepfle (1987) summarize a large body of research concerned with uncovering and analyzing the cognitive structures of ethnographic data gained from a wide range of cultures, individuals and cultural domains. Figure 2 shows all of their main types of KSs, which they define in terms of semantic relations. Their definitions are comparable to Mohan (1986), as the comparison of Figure 1 and Figure 2 indicates. Thus the KSs of Figures 1 and 2 are likely to be appropriate to learners from a range of different cultural backgrounds.

Are these KSs relevant to conceptions of knowledge in school? Statements of school curricula objectives for different content areas aim to describe central features of desired knowledge. Usually they include lists of "thinking skills." Figure 3 arranges selected core "thinking skills" from social studies and science curricula under KS categories, following an analysis by Early, Thew and Wakefield (1986). The match to KSs is obvious, and similar analyses can be made of many other content curricula. One implication is that it is possible to link cognitive objectives across grades and subject areas to a much greater degree than is done at present. Given the present interest in the promotion of communication and thinking skills for language minority and language majority students (Resnick & Klopfer, 1989), this should be an important priority.

Graphic Representation of KSs

Why are central KSs and cognitive processes ("core thinking skills") not more widely identified and developed across the curriculum? This is particularly puzzling because there are a number of reasons why one might expect KSs to be more prominent.

For example, KSs are taught explicitly in various parts of the curriculum. Classification is often taught as part of the subject matter of biology; cause-effect relations are discussed through science experiments; decision making appears in social studies, business studies and home economics. Again, KSs appear frequently throughout the curriculum, showing up as patterns of exposition in textbooks (see the discussion of reading below). But what is particularly notable is the fact that KSs are not difficult to recognize and communicate about. Each of the KSs identified so far has well-known graphic conventions for representing it (see Figure 4), conventions which are relied upon in school textbooks. Thus classes or sets may be shown by Venn diagrams and trees; scientific principles relating two or more variables may be shown by

CLASSIFICATION OR CONCEPTS	PRINCIPLES	EVALUATION OR VALUE
DESCRIPTION	TEMPORAL SEQUENCE	CHOICE OR DECISION MAKING

Figure 1
A Framework of Knowledge Structures

CLASSIFICATION OR CONCEPTS	PRINCIPLES	EVALUATION OR VALUE
taxonomy (classification) part-whole relation	causal chains	values and evaluation
	plans (sequence in time)	decisions
DESCRIPTION	TEMPORAL SEQUENCE	CHOICE OR DECISION MAKING

Figure 2
Main types of cognitive structure in ethnographic semantic analysis (Werner & Schoepfle 1987)

CLASSIFICATION	PRINCIPLES	EVALUATION
classifying	explaining	evaluating
categorizing	predicting	judging
defining	interpreting data and drawing conclusions	criticizing
	developing generalizations (cause, effects, rules, means-ends, reasons)	justifying preference and personal opinions
	relating causes and effects	
	experimenting	forming personal opinions
observing	plan procedures	recommending
describing	carry out procedures	making decisions
naming	arranges events in sequence	recognize issues, problems
comparing	understand time and chronology	identify alternate solutions
contrasting	note changes over time	problem-solving
DESCRIPTION	SEQUENCE	CHOICE

Figure 3
Some core thinking skills across curricula
[Social Studies Grades 1-7, 8-4; Science Grades 1-7, 8-10]
(Early, Thew & Wakefield 1986)

CLASSIFICATION OR CONCEPTS	PRINCIPLES	EVALUATION OR VALUE
tree venn diagram table headings	graph of function/ line graph crossbreak table ordered pair table	rank ordering rating scale value labelling
pictures, slides diagrams maps	action strip time line flowchart	flowchart decision decision tree decision table
DESCRIPTION	TEMPORAL SEQUENCE	CHOICE OR DECISION MAKING

Figure 4
Graphic conventions for
representing knowledge structures

a line graph or a crossbreak table; and decisions may be shown by a decision-tree. Furthermore, there is a known, explicit and well-defined logical and mathematical basis for these KSs and their graphic representation: sets and relations for classes and principles (see Kerlinger, 1973); decision theory for decisions and values (see Giere, 1979); and graph theory for graphic representation (Ore, 1963). Nor is this basis remote from schools; sets, relations and ordering underlie the math curriculum from the early years.

There is considerable evidence that KS graphic representations and other similar graphics help comprehension and subject matter achievement. (It must, however, be pointed out that while all of these KSs have graphic representations, not all graphics represent these KSs.) For instance, Winn (1980) found that block-word diagrams were more effective than text alone for the comprehension of high school biology. Mosenthal (1984) used a mapping graphic strategy to increase comprehension by sixth and eighth grade social studies and physical science students. Levin et al. (1987), in a meta-analysis of the effects of pictures on learning prose content, concluded that all types of text-relevant picture facilitate students' prose learning to some degree.

Yet advocates of graphic instructional techniques express concern that graphics have not been given sufficient attention in schools.

> "...Textbooks frequently contain a variety of graphic aids, and students must develop skills for acquiring information from maps, charts, tables pictures and diagrams...The need for instructional activities which help students to develop these skills is clear. Graphic aids have been identified as an important variable in reading comprehension ... yet many students ignore or only superficially attend to them" (Reinking 1986:146).

A reason for this may be that teachers themselves do not sufficiently value graphics as a medium of intellectual content by comparison with the printed word. In one of the few studies of how graphics are actually used in the classroom, Evans, et al. (1987) concluded that teachers made very few direct references to graphics and provided little guidance in how to use graphics for educational purposes.

How are graphics actually used in classrooms of LEP students to represent KSs and increase understanding of them? Tang (1989) is, to my knowledge, the only research study which has addressed this question. Tang conducted an ethnographic study of two classrooms of seventh grade LEP students across a variety of subject areas. She found that students were exposed to a considerable amount of graphics and, indeed, one chapter of the teacher's guide to one of their socials textbooks specified student assignments which

made use of graphics of all six KSs. Yet without teacher guidance students could not successfully extract information from graphics or use graphics to represent knowledge, nor did they recognize graphics as an alternative way of communicating knowledge. They regarded graphics as decoration, as "art," their general attitude towards graphic representation of KSs was negative, and they did not find graphics helpful for comprehension and recall. With explicit teacher guidance, however, students could use graphics to organize information, were more aware of graphics as a way of communicating knowledge, and were more positive towards graphic representation of knowledge structures.

There is, thus, a need for a systematic approach across the curriculum in which teachers help all students, but particularly LEP students, to use graphics as a way of communicating knowledge and KSs.

Expository Discourse

Reading

In many content classes reading a textbook is the main means of studying the content to be learned. When a student has difficulty reading a textbook, what is the role of language and what is the role of content area knowledge?

Similar questions arise with student writing in content areas and with student understanding of and participation in classroom discussion and lectures. In all of these cases, student performance with the textbook, the written essay and the discussion is affected by a language factor and a content factor. How do the two factors relate to each other? Recent theoretical advances in reading research have introduced a cognitive interactive perspective which sees reading as a complex interaction between reader and text, a view which has been fruitfully applied to reading in the second language (Carrell, Devine & Eskey, 1988). Investigation of the cognitive processes of reading has revealed the importance and variety of the readers' prior knowledge (including content knowledge) and the significance of how the readers' prior knowledge interacts with discourse properties of the text. As Carrell has pointed out in a valuable review (Carrell, 1988), these factors have been significant in recent second language reading research into comprehensibility of reading text. This research has investigated the interaction of the reader's content and formal schemata (knowledge structures) with related characteristics of text.

Reading researchers recognize two types of schema or background knowledge which a reader brings to the text: a content schema is knowledge relative to the content domain of the text; a formal schema is knowledge relative to the formal organizational structures of different types of text (Carrell, 1987: 461). It is convenient to use the term "knowledge structure" to refer only to

formal schema and to foreshadow a later distinction between knowledge structure and text structure.

The facilitating role of content schemata in comprehension serves to indicate the contribution of the content teacher to the LEP students' developing understanding of information in school. The importance of formal schemata indicates an area of common ground for joint action by content teachers and language teachers.

Studies have shown that content schema, the reader's knowledge of the content domain of the text, is significantly related to reading comprehension of that text. With respect to culture-specific content knowledge, an early study by Steffensen, Joag-dev, and Anderson (1979) used rhetorically similar descriptions of an Indian wedding and an American wedding and found that culturally familiar material was read faster and recalled more easily. Of particular interest is work on the effects of content schema in different disciplines or subject areas that has been carried out in the area of English for Specific Purposes. Here it has been shown that text from a familiar subject area is easier to read and understand than linguistically similar material from a less familiar one (Alderson and Urquhart, 1988). These researchers view subject areas like physics as subcultures into which learners are enculturated, and there is evidence that the conventions and intentions of communication vary from one discipline to another.

The interaction of the reader's formal schemata and text structures has been shown to influence comprehensibility for second language readers (Carrell, 1984; Urquhart, 1984). Comprehension can be improved by training learners to recognize text structure. In a study of first language reading, Bartlett (1978) taught ninth grade students to identify top level structure in text, using Meyer's text structure types, and their memory for text information significantly improved. Carrell (1985) similarly showed that explicit training on top level text structures can facilitate intermediate ESL college students' reading comprehension of expository text. These findings suggest that reading comprehension can be significantly increased by teaching LEP students to recognize expository text structure. Meyer's text structure types, as in Meyer (1985), are shown in Fig. 5. The relation to the KSs of Fig. 1 is quite close. The category of "collection" is repeated because Meyer includes both classification and time sequence relations within it.

Further research suggests additional reasons why it might be productive to improve LEP students' recognition of text structure. One reason concerns research on reading strategies and metacognition: research on reading strategies in the L2 has shown the importance of the strategy of recognizing text structure (Block, 1986) and research on metacognition has shown that readers' metacognitive awareness of strategies is related to reading proficiency. Strategy

CLASSIFICATION	PRINCIPLES	EVALUATION
collection	causation	
comparison		
description	collection (sequence)	response
DESCRIPTION	SEQUENCE	CHOICE

Figure 5
Text Structures
(Meyer 1985)

research suggests that less competent learners may improve their skills through training in strategies used by more successful learners. Carrell, Pharis and Liberto (1989) found that metacognitive strategy training was effective in enhancing second language reading with college students. A main stratagem used was semantic mapping, where text information is displayed in graphic form. A second reason concerns research on the effect of awareness of text structure on reading recall. Research in English as a first language has shown that awareness of different text structures improves reading comprehension and recall, especially in expository writing (Richgels, et al., 1987). Carrell (1990) investigated the relationships between awareness and recall performance on different types of expository texts with college ESL students.

There is the potential for a more elegant integration of these elements (metacognition and reading strategies, awareness of text structure) if the link between text structure and graphic representation can be made clearer.

Writing

There are relevant parallels between research on writing in a first or second language and the research on reading reviewed above. One parallel concerns the role of content schema, or knowledge of the content domain being written about. In L1, for example, McCutchen (1986) found that greater knowledge of the content domain of the writing topic was associated with greater cohesion in writing. Similarly, in L2 studies, Selinker and Lakshmanan (1990) found that greater knowledge of the topic domain positively affected interlanguage performance.

A second, and more important, parallel concerns formal schemata or KSs. Text structure has an important role to play in writing research just as it does in reading research, and there is a relation between KSs and text structures. The most detailed and linguistically sophisticated research on text structures of expository writing is being conducted in Australia, within a systemic functional linguistic perspective. "Genre," or distinctive text structure, is a leading idea (see Hasan, 1984; Martin, 1985; Ventola, 1987). Genres are oral or written interactions that people engage in, such as a service encounter in a shop or a written account of a personal experience, and a key feature of a genre is that it is staged, the language user going through a series of stages in order to achieve the purposes of the interaction. Research on a genre based approach to writing has shown that in the early school years, teachers favor narrative genres, and factual or expository genres are neglected; that teachers expect students to write certain genres, but that teachers have little conscious awareness of the genres they require and thus find it difficult to offer constructive assistance to students who are having problems (Hammond, 1987). For current work which applies genre analysis to language learning in Australian schools, see Houston (1989)

CLASSIFICATION	PRINCIPLES	EVALUATION
report	explanation	judgement
description	recount	
DESCRIPTION	SEQUENCE	CHOICE

Figure 6
Genres
(Martin 1985; Rothery 1989)

and Knapp and Callaghan (1989). Houston (1989) is specifically aimed at LEP students.

It is, therefore, a high priority to identify and define the genres of writing with explicit descriptions. Figure 6 shows the main genres identified by Martin (1985) and Christie and Rothery (1989) and indicates the close relation with the knowledge structures of Figure 1. Some more detail about Figure 6 may be helpful. A "recount" is a narrative and reflects time sequence, and a report states what an entire class of things is like, i.e. reflects classification. A judgment is an opinion or judgment about something general and is supported by evidence. The genre analysis of Martin, Christie and Rothery is a precise analysis which links the text structures of genres to their detailed realization in discourse and language systems and is thus far superior to Meyer's looser analysis. This precise analysis illuminates student language as it functions in writing in a way which is valuable for both first and second language writers. Using this analysis, teachers and students can work on the grammar and lexis of writing functionally rather than in isolation from language use.

Will students be able to transfer knowledge of genres between their L1 and their L2? Edelsky (1986) found that young bilingual writers applied what they had learned about writing in Spanish to writing in English in a range of ways relevant to beginning writing. On the other hand, researchers in contrastive rhetoric (Connor & Kaplan, 1987) argue that differences between L1 rhetoric and L2 rhetoric result in interference, which leads to poor performance in L2 writing. It is in relation to this question that differences between KSs and genres become crucial. A KS is considered to be cross cultural (see Werner & Schoepfle above), but a genre description is a detailed analysis of a discourse type within a particular language. To illustrate the difference: in Ancient Egypt the human body was described from head to toe (Rescher, 1964:95), but in Navaho it is strictly prescribed that the body be described from toe to head (Werner & Schoepfle, 1987, vol. 2:85). Both descriptions share the same part-whole KS, but they differ as genres in text sequence.

Graphics and the Integration of Language and Content

To recapitulate, earlier sections have shown how KSs underlie subject area knowledge and thinking skills, how KSs underlie expository discourse both in reading and writing, and how KSs can be represented by graphics. This section will discuss research which provides evidence that teachers and learners can use graphics as links between language and content. The strategy is to use graphics which represent underlying KSs. In this way KS graphics can become a visible language, a common currency and a bridge between the language teacher and the content teacher, and a visible basis for integration and

cooperation. We will discuss reading research first because there is a substantial research literature on the use of graphics in reading.

The reading research literature on graphics has discussed a diversity of graphic forms: graphic organizers, flowcharting, networking and semantic mapping, to name a few. Early uses of graphics tended present key vocabulary (Estes, Mills & Barron, 1969). Later uses placed more emphasis on graphics as a parallel representation of information available in written form in a text. A major advance was made when detailed theories of text structure entered the picture and claims about the graphics-text relation became specific and testable. Thus, recent work by Richgels et al. (1987) used four different graphic organizers to represent four of Meyer's text structures. The effect of using a graphic representation strategy to increase students' ability to recognize text structure has been examined by Alverman and Boothby (1986). Working with fourth grade speakers of English, they found that the experimental group comprehended and recalled significantly more information from content materials.

Turning to LEP students, Tang (1989) researched the effect of a graphic representation on the comprehension of social studies material with seventh grade LEP students at an intermediate level of English. She used a knowledge structure representation, a classification tree graph of a whole-part type, to represent the content of texts describing whole-part structures of civil government taken from the prescribed textbook. She investigated the effect both of teacher-made graphs and student-made graphs. Both strategies facilitated recall of the content. This study was a follow-up to the ethnographic study mentioned above, and she found that teaching these students how to construct graphs changed their attitude towards graphics to a positive one.

By contrast with the situation in reading research, there is less research on the use of graphics in writing. Early (in press) studied the use of knowledge structure graphics by young LEP student writers. Early conducted a qualitative case study of a class of grade four/five students where the teacher had designed a combined science and socials unit on the theme of "Fish" and organized the content around KSs and corresponding graphics. Graphics used included a diagram of the parts of a fish, a classification tree which located fish within the animal kingdom, and a chart that organized information about fish as pets. The graphics served to focus group discussion and to support sustained writing of a high quality across a range of genres. Mohan (1989) compared a junior high LEP student who was an inexperienced writer with a graduate L1 student who was an experienced writer. Both wrote about the same graphic containing social studies information. Both expressed much the same ideas and knowledge structure, but the LEP student was much less able to create quality discourse from the material. The graphic approach revealed the LEP student's difficulties

very clearly: a weaker control of the features of the genre and of discourse "texture" (theme, information focus and cohesion).

Summary

We have reviewed evidence that KSs are cross cultural, that they underlie subject-area knowledge and thinking skills, that they can be represented by graphics, that they underlie expository reading and writing, being realized in discourse and grammar in a variety of ways, and that student awareness of them improves retention of subject matter. For teachers and learners, it is easy to begin to work with KSs. Starting with familiar graphics such as timelines and classifications, they can explore the ways graphics can clarify subject matter and the ways they are expressed in discourse. This can lead to more complex understanding and use. For researchers interested in extending Krashen's thoughts about comprehensible input, the neglected role of content can be addressed, and the KS research is a major step in understanding factors in comprehension. For researchers interested in extending Cummins' work on academic language proficiency, the research on KSs, text structures and genres is a major advance in specifying the nature of academic discourse and its components.

TASK

This section will discuss "task" and ILC. First, it will present the argument that task is a unit of analysis common to both content teaching and language teaching. Then it will discuss task based language teaching in some detail. Next it will show how cooperative learning, learning strategies, and English for Specific Purposes can be related to task and to each other. All of these are promising developments for ILC with LEP students (Fathman, Kessler & Quinn, 1990). Lastly it will examine the problem of analyzing the discourse of tasks, an essential matter both for research and classroom practice.

Task and Education

Classrooms are places where students work, where they do academic tasks. Students do assignments, fill in worksheets, read textbooks, participate in group projects. Yet student tasks have only recently become an important research topic. Doyle (1983) points out that research in the past has paid more attention to teacher activity than to student activity. But student learning may depend more on what the student does than what the teacher does. He argues that student academic work in school is defined by the academic tasks that they encounter that students learn what a task leads them to do; and that modifications in tasks may lead to increased student achievement; hence the basic unit of analysis for schoolwork is task, and "it is necessary to view the curriculum as a collection of academic tasks" (ibid.: 121). From a similar standpoint,

Tikunoff (1987) outlines instructional strategies which help learners to become functionally proficient in student tasks; some of these strategies are for learners in general, and some are for LEP students in particular.

By "curriculum" Doyle means the whole K-12 curriculum: in the early elementary grades, the "basic skills" of language arts and math, along with social studies, music, nutrition, art and physical fitness; in the later grades the content and methods of inquiry of algebra, history, biology and literature. The significance of this perspective for the integration question is that it identifies a common unit of analysis for content work and language work: the task. Research on tasks from a subject matter perspective can be related to research on tasks from a language perspective.

Task and Second Language Teaching

In recent years there has been considerable interest in the language teaching literature in using student tasks as a basic building block for designing the language curriculum or syllabus. Nunan (1988) contrasts the task based syllabus with the traditional grammatical syllabus. The grammatical syllabus is product oriented, emphasizing the learning outcomes, goals or ends of the language course, whereas the task-based syllabus is more process oriented, giving attention to the learning processes or means by which the ability to communicate will be developed. Another contrast uses Wilkins' (1976) distinction between synthetic and analytic syllabuses. The traditional grammatical syllabus is synthetic and its units are different elements of the language that are taught separately; it is assumed that the learner will synthesize these elements together in communication. The task based syllabus is analytic: it is based on the task as a unit; the learner is exposed to the target language holistically, in large chunks, on the assumption that the learner will analyze the language input and develop a knowledge of the linguistic rules. (NB. Neither the product/process contrast nor the synthetic/analytic contrast is to be regarded as a matter of exclusive alternatives).

A central argument against the grammatical syllabus (and in favor of the task based) is that it is based on an analysis of the language to be learned, not on an analysis of the learning process, and so is not consistent within SLA research. "Language learning is a psycholinguistic process not a linguistic one, yet syntactic syllabuses consistently leave the learner out of the picture" (Long & Crookes, unpublished).

There is an important issue here which needs to be clarified. It is sometimes assumed that holistic analytic syllabuses which work with large chunks of language therefore necessarily exclude a focus on form. But there is no reason to believe that the selection of tasks as the major unit of analysis for

a syllabus excludes student reflection on linguistic items as an instructional tactic.

Three types of task-based syllabuses, procedural syllabus, process syllabus and Task Based Language Teaching (TBLT), have been identified and evaluated by Long and Crookes (unpublished). The procedural syllabus is documented in the work of Prabhu in the Bangalore Communicational Teaching Project (Prabhu, 1987) and the project was evaluated (Beretta & Davies, 1985). Communicative tasks in the project included such examples as railway timetables, instructions to draw geometrical figures and solving problems based on values. Note that these are simply "communicative tasks"—not authentic tasks from a content course — and they are not directed at the exploration of a body of content knowledge. The process syllabus has been detailed by Breen and Candlin (Breen & Candlin, 1980; Breen, 1984, 1987; Candlin, 1984, 1987). It aims to make learning processes and the learners' negotiation of these processes central to the syllabus. The task-based language teaching in the work of Long and Crookes (Long, 1985, 1989, to appear; Crookes, 1986; Crookes and Long, 1987; Long and Crookes, unpublished). Long and Crookes make important distinctions among these three types. Firstly, Prabhu's procedural syllabus specifically rejects any direct teaching of language, but TBLT provides for a focus on form. That is, TBLT acknowledges a place for language awareness in language teaching based on the need for negative evidence in SLA (White, 1987) and the value of instructed interlanguage development (Long, 1988). Secondly, Candlin's and Breen's process syllabus is not based on a specific psycholinguistic rationale supported by results from SLA and second language classroom research (Chaudron, 1988) whereas TBLT is. The process syllabus is based on general views of the nature of education and the importance of negotiation and autonomy in learning. Finally, procedural and process syllabuses lack any needs analysis, but TBLT emphasizes the role of needs analysis to identify target tasks.

For these reasons, TBLT is the most appropriate syllabus model and will, therefore, be discussed in more detail. In TBLT task is defined in a broad everyday sense, with focus always on what is done not what is said; "A piece of work or an activity, usually with a specified objective, undertaken as part of an educational course or at work" (Crookes, 1986: 1). TBLT draws on task based needs identification to identify target tasks like solving a math problem or taking notes in a social studies class or participating in a job interview. Target tasks are grouped into more general target task types and pedagogic tasks are derived from these. Broadly speaking, pedagogic tasks are approximations to target tasks which are within the ability of the learner. The task syllabus is formed from a sequence of pedagogic tasks which have been ordered and graded on the basis of such psycholinguistic criteria as are available such as the amount and quality of negotiation work (Long, 1989). Appropriately, the assessment of student learning is by way of task based criterion referenced tests.

A special feature of TBLT (Long & Crookes unpublished: 4-6) is the way it adopts task as the unit of analysis in an attempt to provide an internally coherent approach to all six phases of program design: needs identification, syllabus design, methodology design, materials writing, testing and program evaluation.

It was mentioned above that TBLT emphasizes the role of needs analyses to identify target tasks, whereas procedural and process syllabuses do not. This is of special importance (see Horowitz, 1986). In programs for LEP students, the target tasks for the integration of language and content include the academic tasks they face in content classrooms and the occupational tasks they face in the world of work. It is a central goal of LEP programs to prepare students for these tasks. Of the three various task-based syllabuses considered, TBLT is the only one that addresses this goal.

Tasks, Group Work and Cooperative Learning

One prominent format for tasks is group work—tasks which two or more students work on together (see Gaies, 1985). Long and Porter (1985) review the arguments for group work in classroom second language learning, organizing them in two classes: pedagogical arguments and psycholinguistic arguments. The central pedagogical argument for group work is that it increases the quantity of student talk, the opportunity to practice language. The predominant teacher fronted lockstep classroom where the teacher talks as much as two-thirds of the time to the whole class leaves little opportunity for student talk. The central psycholinguistic argument for group work is an increase in the quality of student talk (in terms of the negotiation process); it provides opportunities for students to negotiate language input to their level of comprehension. Negotiation can be assessed by analyzing task dialogues for conversational repairs. Thus, we have a way to evaluate task performance based on known measures backed up by a psycholinguistic rationale.

McGroarty describes how cooperative learning offers the opportunity to integrate language learning and content learning (McGroarty, 1989, forthcoming). She defines cooperative learning and then discusses its implications for learners. "Cooperative methods require that the whole class be subdivided into groups which work together to accomplish academic tasks" (McGroarty, 1989: 129). There are a variety of cooperative methods including peer tutoring, jigsaw (in which individual students have responsibility for a single part of a team learning task), cooperative projects in which a group works together to produce a collective project, cooperative/individualized methods, in which a student's individual progress contributes to a team grade, and cooperative instruction, in which students work on individual assignments requiring interaction but are graded individually. McGroarty identifies various

advantages that cooperative learning arrangements can offer LEP students: the move from a competitive classroom environment to a cooperative one, the possibility for the use of the first language in ways that support content learning and enhance second language development, and encouragement for students to take a mutual and active role in the acquisition of knowledge and language skills, thus empowering minority students through a reciprocal interaction model of learning (De Avila, 1986) emphasizing student control of classroom discourse and discovery processes.

In particular, referring to Long and Porter (1985), she argues that (1989: 131) "cooperative learning as exemplified in small group work provides frequent opportunity for natural second language practice and negotiation of meaning through talk." In other words, the Long and Porter psycholinguistic rationale for group work tasks offers a psycholinguistic rationale for cooperative learning tasks.

These considerations call for new research directions. An example will help to show these directions more clearly. Bejarano (1987) studied cooperative small group methodology in the EFL language classroom and provided one of the few studies that links second language group work to cooperative learning. Using seventh grade English classes in Israel, she compared two small group cooperative techniques with the whole class method and found the cooperative techniques superior, as measured by a language achievement test. While the Bejarano study is valuable from the perspective of language teaching alone, it differs in important ways from the research directions necessary for LEP students and ILC. Firstly, it examines cooperative techniques in group work in the language classroom not the content classroom, Secondly, while it uses a final achievement test to assess these techniques, it does not also examine the discourse processes of cooperative tasks.

By contrast a prime area of concern for ILC is the use of cooperative learning tasks in content classes rather than language classes and a particular target is the evaluation of the discourse processes of different types of cooperative tasks. There is need to see whether the discourse demands of the tasks created by the various cooperative learning techniques are diverse (peer tutoring vs. group discussion, for example) and vary with group composition (native speakers and LEP students) and different levels of language proficiency of LEP students. Wong Fillmore (1989) reports that heterogeneous grouping (in which students present a range of language proficiency) is more conducive to language learning than homogeneous grouping. How do these different cooperative techniques interact with variation in group composition (See Long, 1989, on task group combinations.)?

Cooperative learning raises further research issues within the task paradigm. The tasks examined in SLA research and used in the language

classroom, like discussing the arrangement of flowers on a feltboard garden, may be quite trivial and isolated from and unconnected with earlier or later tasks. But the tasks chosen in a well-designed cooperative learning unit in a content classroom should form a coherent progression within the context of the subject area, constituting a complex "ecology" of tasks. What are the differences in performance between "isolated" tasks and tasks in the context of a content unit? Similarly important is the question of the degree to which different tasks elicit cognitive discourse. This is a question which has been neglected in cooperative learning research so far and urgently needs to be addressed (McGroarty, forthcoming:43). Peer tutoring, for example, would seem to call for cognitive academic discourse par excellence.

Task and Learning Strategies

A topic of much research interest in recent years has been learning strategies, both in education in general (Weinstein & Meyer, 1985) and in language learning in particular (Wenden & Rubin, 1987; Oxford 1990). Derry (1989: 5) gives a compact but useful explanation of learning strategies: "learning is a form of problem solving that involves analyzing a learning task and deriving a strategy appropriate for that situation." In this view, a learning strategy is a way of working on a learning task. Thus, there is an inherent connection between tasks and strategies. Moreover, the choice of strategy must take account of the task involved (Derry, 1989: 9; Oxford, 1990: 13). A recent strategy observation scale for classroom, the Class Observation Guide (O'Malley, et al., 1985b: 563-64) includes a number of aspects of a strategy including the task (or "activity") in which it is used. Learning strategies and cooperative learning are not mutually exclusive. Dansereau (1988) has studied cooperative learning strategies, and within the field of language learning, a number of scholars include cooperation with others as one type of learning strategy.

Chamot and O'Malley (O'Malley, et al., 1985a, 1985b; Chamot & O'Malley, 1987; O'Malley, Chamot & Walker, 1987; O'Malley & Chamot, 1989) have done important work on the learning strategies of LEP students. They see learning strategies instruction as a learner-oriented approach to teaching that helps students learn conscious processes and techniques that facilitate the comprehension, acquisition and retention of new skills and concepts; and as an approach based, following their research and that of others, on the propositions that strategic learners are better learners, that strategies can be taught, that learning strategies transfer to new tasks and, significantly, that academic language learning is more effective with learning strategies. From their research, they have identified three broad categories of learning strategies: metacognitive, cognitive and social-affective (which includes cooperation between students); they have found strategy instruction successful with integrative tasks of listening and speaking, and they particularly recommend instruction

in metacognitive strategies (selective attention, self-monitoring and self-evaluation) because these apply widely.

Much of the work on language learning strategies is directed to the learning of the second language in the second language classroom. What, then, is the relevance to the language and content integration? O'Malley and Chamot state that their learning strategies as a whole should not be considered unique to second language learning because they apply both to English language development and to content area instruction (O'Malley, 1988: 51) and both to second language learners and first language learners. However, they believe that LEP students have difficulty employing learning strategies because, by comparison with native English speakers, they have less facility in meeting the demands of learning and using academic language in English.

Chamot and O'Malley illustrate how learning strategies can be incorporated with language learning and content learning through their design of the "Cognitive Academic Language Learning Approach" (CALLA) to provide transitional instruction for LEP students who are being prepared to participate in mainstream content area instruction. CALLA has three components: a curriculum correlated with mainstream content subjects and academic language development activities (in which they use Cummins' model of contextual and cognitive continua for L2 tasks) and learning strategy instruction. It has been implemented in a number of school districts and in a variety of workshops where teachers have applied the CALLA model to their own material.

The theoretical rationale for CALLA is based on the cognitive theory of Anderson (1985), which distinguishes between declarative knowledge, as in the facts and rules of academic content and procedural knowledge, or the routines and processes which become automatic with practice. This distinction is an important issue for future research. There is disagreement among applied linguists as to how it applies to language learning (DeKeyser, 1988: 109) and, to take one content area, there is debate among mathematics educators as to how it applies to mathematics learning (Hiebert, 1986). And, again, Anderson himself sees the relation of his theory to naturalistic educational interactions as an urgent matter for further study and a centrally important source of data; in a discussion of methodologies for studying human knowledge, Anderson (1987:476) argues that research on pedagogical programs for teaching, and particularly for teaching second languages, would be an excellent paradigm for studying the application of his theory.

As learning strategies and cooperative learning are used more frequently with LEP students, we are likely to find students discussing and sharing strategies as they work together. This aspect of student interaction is a promising area for study, not only because it is a way that students can learn strategies from their peers but also because it offers a natural window on

everyday use of strategies in the classroom and on the role of declarative and procedural knowledge.

Task and English for Specific Purposes

Central to the integration of language and content is the question of the language demands of content-area tasks. The general body of scholarly work which deals with this issue is the area of "English for Specific Purposes," typically subdivided into English for Academic Purposes (EAP) and English for Occupational Purposes (Robinson, 1980; Widdowson, 1983; Swales, 1985; Hutchinson & Waters, 1987).

Early work in ESP and EAP was largely concerned with identifying grammatical features of texts. For example, it was noted that textbooks in science made frequent use of passive sentences, and this was incorporated into ESP courses for students learning science through the L2. We can note three lines of development away from this: discourse genres, learning tasks, and discourse communities. One line of development has been in the analysis of text, from individual syntactic features of text to a more inclusive view which sees these features in the wider context of rhetorical structures and discourse genres (Swales, 1987). Another line of development has been to shift emphasis from the linguistic features of texts to the developmental possibilities of learning tasks: to identify communicative tasks in the target situation (i.e., target tasks) and to design learning tasks (i.e., pedagogical tasks) which act as vehicles to help the learner develop the ability to do the target task (Hutchinson & Waters, 1987: 92, 109). The reasons for this move are essentially the same as those motivating the task-based syllabus generally: a desire to incorporate the learner and the learning process into the total course design and to integrate the various components of a curriculum. A third development has been to see texts not in isolation but in the cultural context of a discourse community in relation to communicative purposes within a communicative setting: for example, to consider not only the language and discourse characteristics of the high school science textbook but also the role the textbook plays in the work of the science class and in the academic subculture of school science with its appropriate disciplinary problems, data and methods of argument (Swales, 1985: 211).

A valuable example of research with LEP students which has been influenced by the ESP perspective is the work of Spanos, Rhodes, Dale and Crandall (1988) on the ways in which students develop and use math language in their mathematics and algebra learning, with special attention to instances in which language serves as a barrier to effective problem solving. They recorded small groups of students cooperating to solve mathematical problems and analyzed the verbal protocols of the students. Using a concept of the "register," or special language, of mathematics outlined by Halliday (1978),

they identified syntactic, semantic and pragmatic features of mathematics language which were causing difficulty for the students.

The work of the CAL group can be seen in the context of a larger body of work within mathematics learning on problem solving. For example, Lochhead (1985) describes a classroom technique of pair or cooperative problem solving, in which one partner reads and thinks aloud while the other partner listens, checking for accuracy and demanding constant talk. This is a group work learning strategy which aims to teach analytic reasoning skills. Viewed in this context, the work of the CAL group clearly illustrates the natural fit among learning tasks (in this case, mathematical problem solving tasks), cooperative group work strategies, and the language demands of academic tasks. Cooperative problem solving talk acts in two roles — as a classroom strategy and as an important and natural source of discourse data for research. Language and content are integrated through the concept of the special purpose language of the task.

Task and the Analysis of Discourse Interaction

There are a variety of research methods that can be used to examine tasks; observation and interview are two of the most obvious. But if we are concerned with the integration of language and content, then a central place should be given to the analysis of the discourse of groups of students as they work on target tasks from content areas or learning tasks related to these target tasks. The analysis of such data has the potential to show, among other things, how language and content knowledge interweave and how tasks, cooperation, learning strategies and content-specific language interrelate. This area of discourse analysis is of value not only to researchers; it is directly useful to teachers and teacher educators who need to sharpen their evaluation of classroom tasks that integrate language and content development.

What approaches to the analysis of task discourse can be used to illuminate the integration of language and content? Despite the volume of general research which uses some form of discourse analysis, there is currently remarkably little which makes a direct contribution to our question, and hence there is a severe research gap which needs to be filled. Let us consider the matter with respect to the content-based language learning literature discussed in the previous section.

ESP Model

The work of the CAL group, Spanos, Rhodes, Dale and Crandall (1988), which used task group work to identify student difficulties with the special "register" of mathematics, links language and content through a theory of register and points to language difficulties in target tasks in the mathematics

classroom. (For more recent work by this group, see the paper by Spanos and Crandall in Padilla, et al., 1990.)

Since much previous English for Specific Purposes research concentrated on the analysis of written texts in the target situation, the work of the CAL group is a valuable, significant example of the extension of this research to interactive tasks. A current body of opinion in ESP (e.g., Hutchinson & Waters, 1987) stresses the development potential of learning tasks more than the linguistic demands of target tasks and would presumably argue that the CAL group approach should be extended to study how students can use interactive learning tasks to learn the mathematics register. This could be a promising research initiative, though it should be noted that Hutchinson and Waters offer no specific suggestions for research implementation. And since the CAL group designed materials that are to be used in paired tutoring sessions (ibid: 236), paired tutoring would be a good source of data for this question.

Negotiation of Meaning Model

The negotiation of meaning approach builds on Krashen's Input model. In Long and Porter (1985) the central measures for the analysis of task discourse are features of conversational modification: clarification requests, confirmation checks, comprehension checks and similar moves in conversational exchanges. In this way Long adds "interaction" to Krashen's theory of "input." These indications of conversational repair work, or negotiation work, are seen as ways speakers negotiate and adjust conversational input to their level of understanding and thus foster second language acquisition. The analysis of conversational negotiation and repair has been the major approach to the performance of second language learners and tasks. It has been used in a large number of studies, many of which form the basis for a psycholinguistic taxonomy of pedagogical task types which is clearly needed for curriculum decisions (see Long, 1989).

Cummins' Language Proficiency model

A major objection to a sole reliance on measures of negotiation work in tasks for present purposes is that there is no reason to believe that they are measures of the development of academic language proficiency. This is not to deny the value of negotiation measures but rather to say that they are not adequate measures of cognitive language use. What would be more adequate? Cummins' (1984) theory of cognitive academic language proficiency significantly revises his earlier models of language proficiency and argues that there are two significant dimensions of communicative tasks and activities: a cognitive dimension (cognitively undemanding to cognitively demanding) and a contextual dimension (context-embedded to context-reduced). Cummins supports this claim with reference to a wide range of psychological and

psycholinguistic literature but does not deal with the problem of the analysis of task data. Nor is the analysis of task data per se addressed in the later large scale study of bilingual proficiency (Harley, Allen, Cummins & Swain, 1987). This is a significant gap which calls for research not merely to make Cummins' model more directly testable but also to develop the model further.

Staab (1983, 1986) addresses the question of the cognitive dimension of communicative tasks in her work with elementary school first language learners. Staab (1983) explored the relation of communicative tasks (or "activities") in a kindergarten class to the categories of language function developed by Tough based on the earlier work of M. A. K. Halliday. Earlier work had found that the majority of spontaneous classroom interactions of six-year-olds consisted of the more "social" functions of maintaining the portion of the self in relation to others, controlling the behavior of others and communicating information. By arranging specifically designed group communicative tasks such as solving a science experiment problem or organizing an imagined zoo, Staab was able to elicit different functions from different tasks and particularly to elicit the more cognitive language functions of forecasting and reasoning. Staab (1986) explored the elicitation of the language function of forecasting/reasoning in elementary school classrooms with kindergarten, grade three and grade six students. Staab's work provides evidence that there is an established approach to studying the cognitive/linguistic aspect of tasks, that task design and teacher support can significantly increase the cognitive language potential of tasks, and that cognitive language development is an important concern for first language education and one that should be sustained into the later school years.

The context-embedded/context-reduced dimension of tasks can to some degree be studied through the use of reference in task interaction. Halliday and Hasan (1976, 1985) distinguish between situational or "exophoric" reference and textual or "endophoric" reference. This parallels Cummins' description of context embedded communication relying on situational cues to meaning and context reduced communication relying on linguistic cues to meaning. (It also indicates that the distinction should be termed "situational context/textual context." Communication which relies on linguistic cues to meaning does not have a reduced context; rather, it has a textual context.)

Berwick (1988) applied these measures to pedagogic tasks performed by adult speakers of English as a foreign language. He compared an instructional "hands-on" task which was face to face with a comparable one which was "back to back." One task involved the construction of a small Lego (snap-on) toy with the participants sitting back to back, one participant using a set of sequenced, graphic instructions and the other assembling the pieces. The other task was similar but with the participants sitting face to face. Predictably, he found the face to face task included more exophoric reference.

These measures of the cognitive and contextual dimensions are only a beginning, but they can and should be used with tasks performed by LEP students of school age in order to explore Cummins' model further. It should be noted that neither language function analysis nor reference analysis is limited to English. Both analyses can be used to study the development of cognitive/ academic language in both of a bilingual's languages.

Language Socialization Model

Bruner's investigation of young children learning game like activities through interaction with their mothers is a central example of the analysis of task and discourse in the language socialization perspective. Bruner (1983) shows how games as simple as peekaboo or hide and seek form tasks which are shaped in formats, or script-like interaction from which the child learns both language and culture. Initially the mother enacts the entire script of verbal and non verbal actions, but gradually arranges for the child to take over, "scaffolding" the interaction so that the child participates progressively and successfully, operating in the child's zone of proximal development. In other words, somebody with knowledge and awareness scaffolds a task for somebody without knowledge and awareness until the latter becomes capable of "reaching higher ground." For a discussion of the observation of classroom tasks from a perspective somewhat similar to Bruner's, see Erickson (1986).

"Scaffolding" is the most obvious feature of Bruner's analysis and has been a very popular concept. There has been research on interactional routines (Schieffelin & Ochs 1986) and on scaffolding with particular reference to the classroom (Cazden, 1988: ch.6). Hawkins (1988) studied scaffolded classroom interaction with fourth grade LEP students and found evidence that scaffolded interaction led to independent problem solving on the part of LEP students.

Critics have pointed out that scaffolding analysis is insufficient. Wertsch (1984) argues that the zone of proximal development involves different task definitions held by the adult and child (or by expert and novice), and the successful adult brings the child's definition of the task close to the more mature conception held by the adult (Rogoff & Wertsch, 1984). Cazden points out (ibid: 107-10) that the routine and scaffolding analysis is an inadequate discourse model of learning interactions because it fails to account for the development of the teacher's definition of the situation — how the learner comes to interpret the task situation in a new way, grasp the underlying principles and "go beyond the information given." To return to Bruner's game metaphor, the routine and scaffold analysis is an account of play in the game; it is not an account of rules which constitute the definition of the situation in the game. It is an account of how language is used to do a task; it is not an account of how language is used to interpret or reflect on a task or of how

language is used to discuss knowledge. To restate: just as a game involves both play and rules, a task involves both practice and theory, action and background knowledge/frame of reference/definition of the situation. A more adequate analysis of task and discourse must account for both. This is a research priority for the further extension of the language socialization model. Cazden (1988:134) has pointed out the significance of students' talking to learn with their peers in the classroom: students can reciprocally take on the role of the teacher and practice forms of academic discourse. A more adequate analysis would help to capture this significance.

THE RELATION OF KNOWLEDGE STRUCTURES AND TASKS

How are "knowledge structures" and "student tasks" related? Anthropologists such as Spradley (1980) would see them as complementary, related as knowledge and action are related. Cultural knowledge guides cultural action; cultural action changes cultural knowledge. Knowledge structures illuminate the shape of academic knowledge and discourse; student tasks illuminate the processes of academic development.

Some work in education, however, has tended to see these two themes as opposed alternatives, as part of two exclusively different approaches to teaching. Knowledge structures, written genres and text patterns were seen as part of a static, teacher centered, literacy based, product oriented approach; student tasks and activities were seen as part of a dynamic, student centered, oral, process-oriented approach.

More recent work tends to regard product and process as complementary. A clear example is provided by Langer's and Applebee's work on writing across the curriculum in the first language (Langer & Applebee, 1987). They described the text structures of academic writing in content classrooms and also investigated the effect of student tasks such as note taking and essay writing. This indicates how it is necessary to combine a view of the organization of academic information with a view of how students work with such information.

The link between knowledge structures and student tasks is a complex and dynamic relation that future developments in ILC will explore in depth. Some important questions will be: how do knowledge structures apply to spoken interaction and to communicative tasks? How do formal and content schema influence performance in student tasks? How do task processes develop knowledge structures? Since group work with LEP students is liable to communication breakdowns, will the use of graphic representations reduce breakdowns? A course of study will typically contain both organized knowledge and student tasks. In such a course, how are textbooks, classroom interaction and student assignments woven together into a complex ecology?

CONCLUSION

The following recommendations are suggested to teachers and researchers with respect to knowledge structures and student tasks.

Regarding knowledge structures, cooperating language teachers and content teachers should:

(1) agree on knowledge structures common to both language and content goals and identify common graphic conventions for representing these KSs;
(2) identify and use KSs and relevant graphics in content course material and create graphic overviews of difficult material. They should help LEP students learn to do these things independently; and
(3) relate KSs to broad patterns of discourse in reading and writing and to the fine detail of grammar and vocabulary. They should help LEP students do this independently.

Regarding knowledge structures, researchers should:

(1) provide a more detailed analysis of KSs across the curriculum, of the main forms of graphic representation of KSs, and of the ways KSs are realized in discourse and grammar;
(2) study the processes whereby the teachers of LEP students use KSs as a means of cooperating to integrate language and content; and
(3) study the processes whereby LEP students come to learn and make use of KSs and their realizations in graphics and language.

Regarding student tasks, cooperating language teachers and content teachers should:

(1) agree on target tasks which can be both language and content goals. These will often be tasks essential to content classrooms;
(2) develop language-sensitive ways to support LEP students' work on content tasks;
(3) develop learning tasks in the language class to support the target tasks of the content classroom;
(4) consider the possibility of using group work and cooperative learning, of developing learning strategies for tasks, of developing the special purpose language needed for specific tasks; and
(5) consider ways of observing discourse and interaction during tasks as ways of assessing the value of the task and of improving the task design.

With regard to student tasks, researchers should:

(1) coordinate research on task from a language perspective with research on task from a general educational perspective, with a view to the interests of LEP students;

(2) continue and extend the work on LEP students and cooperative learning, learning strategies, and English for Specific Purposes and examine the possible linkages between these three areas; and
(3) continue and extend work on the task discourse of LEP students, both quantitative and qualitative, analytic and holistic.

This review has discussed knowledge structures and tasks as two different ways of thinking about the integration of language learning and content learning. We can look at both from a content perspective or from a language perspective. Both can be approached in a basic way so that they are easy topics of discussion and practical exploration with students and teachers. Knowledge structures can be approached very simply through graphics, and tasks can be approached very simply through student assignments and classroom activities. Both lend themselves to organizing and treating in a coherent way a number of elements that had been fragmented and unrelated before. Both have immediate practical implications and both raise important research questions. Knowledge structures and tasks are not alternatives: they are complementary ways of looking at the integration of language learning and content learning. Future work will take advantage of the ways they complement each other.

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